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RESOURCE DATA AND SPECIES AT RISK SECTION

RESEARCHING AMPHIBIAN NUMBERS IN ALBERTA (RANA): 2003 PROVINCIAL REPORT

Alberta Species at Risk Report No. 83

Alberta
SUSTAINABLE RESOURCE DEVELOPMENT

Researching Amphibian Numbers in Alberta (RANA)

2003 Provincial Report

Lisa Wilkinson
and
Kent Kempin

Alberta Species at Risk Report No. 83

2004

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For copies of this report, contact:

Information Centre – Publications
Alberta Environment / Alberta Sustainable Resource Development
Main Floor, Great West Life Building
9920 108 Street
Edmonton, Alberta, Canada T5K 2M4
Telephone (780) 422-2079

OR

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RANA has succeeded over the years through financial and in-kind support from a number of agencies, as well as the continued support of dedicated individuals. This program is a testament to the possibilities and kind of success that can occur when supportive individuals and agencies believe in a common goal.

EXECUTIVE SUMMARY

Six RANA (Researching Amphibian Numbers in Alberta) sites were operated in 2003: Kananaskis (Bow Valley), Hinton (Athabasca Valley), Lesser Slave Lake Provincial Park, Saskatoon Island Provincial Park, Cypress Hills Provincial Park, and Meanook Biological Research Station.

Seven species were captured in 2003: boreal chorus frogs, boreal toads, long-toed salamanders, northern leopard frogs, tiger salamanders, wood frogs, and Columbia spotted frogs. Columbia spotted frogs and northern leopard frogs had not been captured previously in the RANA program. Shoreline pond surveys were conducted at 214 ponds within five RANA study areas, with an additional 29 pond surveys in Jasper National Park. Species observed, in order of decreasing abundance, were: wood frogs, long-toed salamanders, boreal toads, boreal chorus frogs, northern leopard frogs, tiger salamanders, and Columbia spotted frogs. No Canadian toads were observed, despite having study sites within their range. Regional and provincial summaries of amphibian morphological characteristics are provided in this report, along with summaries of capture rates for all species encountered at each of the RANA trapping ponds. Educational programs reached approximately 6,000 people.

1.0 INTRODUCTION

Field data collection for the Researching Amphibian Numbers in Alberta (RANA) program was initiated in 1997 in response to the global decline of amphibians. RANA has two primary objectives: 1) collect long-term data on amphibian species populations in Alberta, and 2) provide public education on the importance of amphibians and wetland conservation. Two sites were operated in 1997, and since that time, an additional five monitoring sites were established, although not all sites can be operated every year.

There were six active sites in 2003: Lesser Slave Lake Provincial Park (est. 1997), Saskatoon Island Provincial Park (est. 1999), Meanook Research Station (est. 1997), Cypress Hills Provincial Park (est. 1999), Athabasca Valley (Hinton; est. 2000), and Bow Valley (Kananaskis; est. 1998). Beaverhill Lake is no longer operated as a RANA site due to logistical constraints.

The following species have been captured or observed in the RANA program: wood frogs (*Rana sylvatica*), boreal chorus frogs (*Pseudacris maculata*), Columbia spotted frogs (*Rana luteiventris*), northern leopard frogs (*Rana pipiens*), boreal toads (*Bufo boreas*), Canadian toads (*Bufo hemiophrys*), long-toed salamanders (*Ambystoma macrodactylum*), and tiger salamanders (*Ambystoma tigrinum*). The only two amphibian species that have not been observed during the RANA program are the great plains toad (*Bufo cognatus*) and the plains spadefoot toad (*Spea bombifrons*), both of which are found in the grassland natural region (Alberta Environmental Protection 1994), which is not currently represented. Only one Canadian toad has been captured since the establishment of the RANA program, in 1998 at Lesser Slave Lake.

Few of Alberta's amphibians are considered 'secure'. Of the species encountered in the RANA program, the northern leopard frog is 'threatened', the Canadian toad is 'data deficient' ('may be at risk'), and the long-toed salamander and Columbia spotted frog are 'sensitive' (Alberta Sustainable Resource Development 2000). Long-toed salamanders are the focal species in Hinton and Kananaskis due to the current provincial objective to monitor their population distribution and trends for at least five years. Additional details of the salamander program are in Wilkinson and Hanus (2003).

Public education has always been a fundamental component of the RANA program. Education takes the form of presentations, public event displays, guided hikes, school talks and other activities. Technical presentations are given to land-use managers (industry and government) and at biological conferences. In conjunction with RANA educational programs, the Alberta Amphibian Monitoring Program (AAMP) is promoted. This program encourages members of the public to record and submit amphibian observations throughout the province. An instruction manual, including identification photos and a tape of frog and toad calls, is also provided to interested individuals.

This document is a compilation of 2003 field results from each RANA site summarizing key findings. Individual field summary reports for 2003 have been developed for Hinton (Hanus 2004), Kananaskis (Rose 2004), Lesser Slave Lake Provincial Park (Kempin 2004), Saskatoon Island Provincial Park (Augustyn 2004), Cypress Hills Provincial Park (Rempel 2004), and Meanook Biological Research Station (Kempin 2004).

2.0 STUDY AREA

The RANA program has sites distributed across Alberta (Figure 1) to represent a variety of natural regions (Alberta Environmental Protection 1994). Cypress Hills is located in a unique montane ecosystem within the grassland natural region, Kananaskis (Bow Valley) is located in the rocky mountain and foothills natural regions, the Hinton (Athabasca Valley) site is located in the foothills natural region, and the Meanook Biological Research Station, Lesser Slave Lake and Saskatoon Island Provincial Park sites are located in different parts of the boreal forest natural region. In addition, pond surveys were conducted in and around Jasper National Park, as part of the long-toed salamander monitoring program.

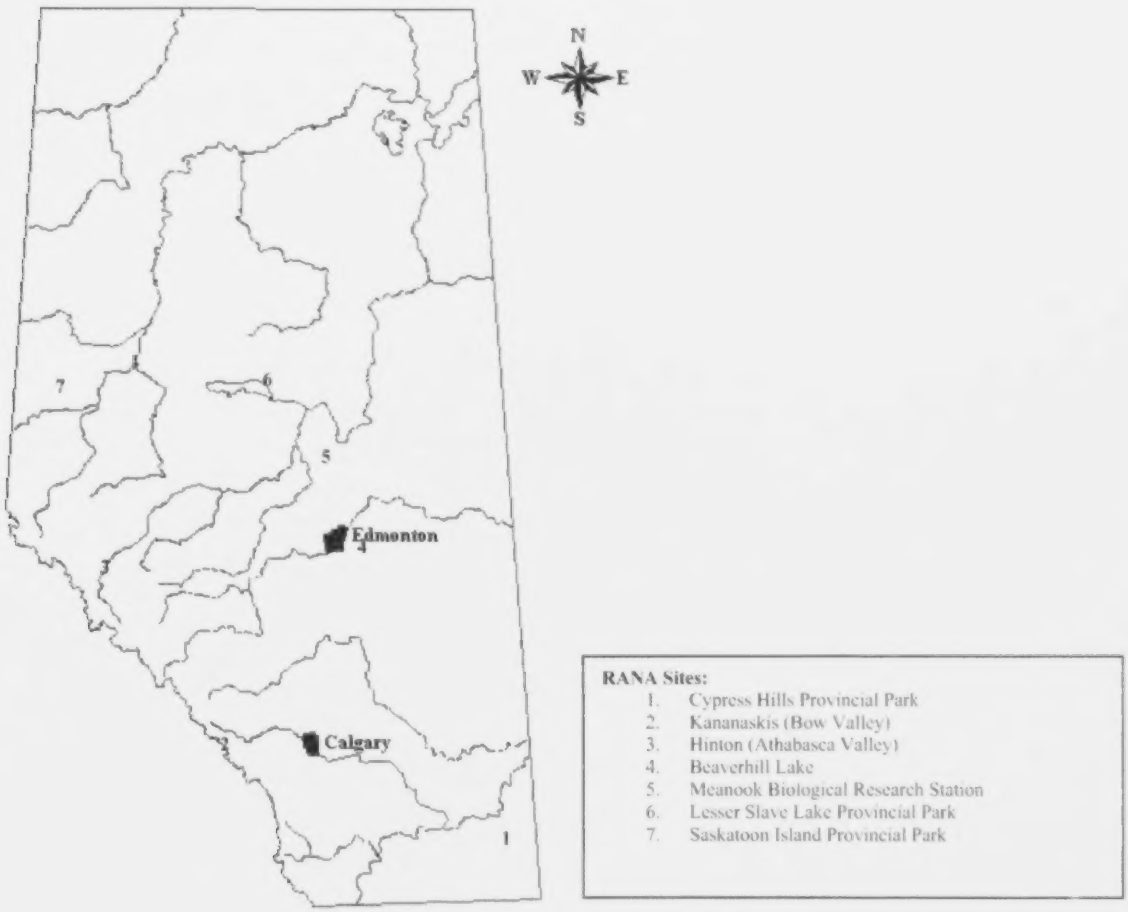

Figure 1. Alberta distribution of RANA sites.

3.0 METHODS

Methods for surveying and capturing long-toed salamanders and other amphibians followed Pretzlaw *et al.* (2002), and are summarized below. Any variations to the methods are included in the individual site reports.

3.1 Pitfall Trapping

In each RANA survey area, there is one pond set up for pitfall trapping. The pond is completely or partially encircled with drift net fencing (Figure 2A). Pitfall traps are placed at 10 m intervals on either side of the fence. Theoretically, amphibians travelling to or from the pond to breed will be intercepted by the fence and travel along the barrier until they fall into a trap. Traps consist of two 6-inch plastic flower pots taped together, creating a 12-inch deep trap (Figure 2B). Traps are covered by a square of coroplast, a sturdy and water resistant plastic, held above the traps by 6-inch nails. Trap covers ensure that amphibians are protected from excessive exposure to sun, which can lead to desiccation, and prevent flooding from rainfall. The following items are placed in each trap: a sponge and/or moss, which is refreshed regularly to retain moisture; a rock that serves as a perch or hiding place; and a stick protruding past the top of the trap to allow small mammals to escape.

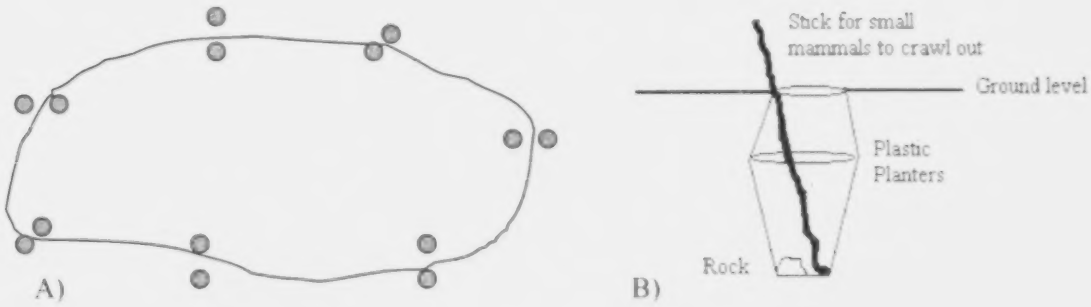

Figure 2. Layout of fencing and pitfall traps (A), and close-up of pitfall trap design (B).

Trapping schedules varied slightly between sites, but traps were generally set during the spring breeding season (May to early June), and late summer (August to early September) when young-of-the-year disperse from the ponds. The Meanook site was operated from July to mid-August for logistic reasons. Throughout the trapping sessions, traps were checked daily or every other day. Traps were generally closed during mid-summer when amphibian movement to and from ponds declined. Captured animals were identified to species, measured, weighed, and sex and age determinations were made when possible. Animals were released on the opposite side of the fence from which they were captured. Other morphological characteristics, such as presence of dorsal stripes and malformations were also recorded. Small individuals captured at the beginning of the season were presumed to be juveniles (young-of-the-year from the previous season). Age and sex differentiation was not possible for all species. Researchers used latex gloves when handling amphibians to avoid contaminating amphibians with oils or hand lotion. Animals being released away from the pond were moistened and placed in a sheltered

location; extra care was taken on hot days, releasing amphibians early or late in the day to prevent desiccation. Environmental data were also collected, including air and water temperature, pond pH, water depth, and other ambient conditions. At the Hinton RANA site, long-toed salamanders were marked with elastomer (a non-toxic latex) as part of an ongoing mark-recapture study (refer to Wilkinson and Hanus 2003 for details).

At the end of each trapping session all traps were closed by either pushing the coroplast cover flush to the ground and covering it with dirt and a rock, or by inverting traps, to ensure animals could not enter. Also, sections of fence were opened at several locations around the pond to allow animals to pass through.

3.2 Shoreline Pond Surveys

Pond surveys were conducted to identify presence of breeding amphibians through observations of eggs, larvae/tadpoles, young-of-the-year, or adults, as well as to hear vocalizations in the spring. Survey efforts were most intensive during spring egg-laying, although some ponds were visited later in the summer to look for presence of larvae and tadpoles.

Surveys were conducted by walking along the perimeter of a pond, or using transects for large and/or partially inaccessible water bodies, and looking for signs of amphibian presence. Surveys could not be conducted under excessively windy or rainy conditions because the surface of the water was disturbed. Similarly, care was taken not to disturb the surface of the water around the shoreline. Data recorded included number of salamander eggs, number of frog egg masses, and number of toad egg strings. For observations of larvae and tadpoles a specific count was made if possible, otherwise qualitative observations were made using estimates of few, moderate, or abundant (a similar system applies to vocalizations). Observations of adults were also recorded. Environmental data were collected as per pitfall trapping ponds, and GPS locations were recorded for all ponds surveyed.

At some sites, the length of survey distance was recorded, allowing for future calculations of number of eggs/meter, enabling relative abundance comparisons over time.

3.3 Reports and Data Storage

In addition to this summary report, a report was produced for each RANA site and distributed to local government offices, stakeholders, funding agencies, participants and volunteers, and other interested parties. All data have been electronically recorded and incorporated into the provincial government Biodiversity/Species Observation Database (BSOD).

4.0 RESULTS

4.1 Pitfall Trapping

Results from spring and late summer pitfall trapping sessions are provided in Table 1 and 2, respectively. In addition, amphibian capture data from each RANA site since their establishment is provided in Appendix 1.

4.1.1 Spring Pitfall Trapping Session

Five of the six active RANA sites were open during the spring trapping session in 2003, and a total of five amphibian species were captured (Table 1). Wood frogs were the most numerous amphibian species captured during the spring trap session (287), with nearly 80% of those captures at Lesser Slave Lake Provincial Park. Long-toed salamanders were the second-most captured species in the spring (218) and were found only at the Hinton and Kananaskis sites, followed by boreal chorus frogs (49), boreal toads (36), and tiger salamanders (6). No one species was present at all trapping sites, but wood frogs were caught at every site except Cypress Hills Provincial Park.

4.1.2 Late Summer Pitfall Trapping Session

Five of the six active RANA sites were open during the late summer trapping session, with Meanook being operational for the early part of this period (July 4 – Aug. 12). A total of seven amphibian species were captured (Table 2). Of the species observed, wood frogs were the most numerous, primarily due to the large number of young-of-the-year captured at the Meanook site (1989). Other amphibian species captured, in decreasing order of abundance, were long-toed salamanders (173), boreal toads (91), northern leopard frogs (71), boreal chorus frogs (32), tiger salamanders (4), and Columbia spotted frogs (1;).

4.2 Shoreline Pond Surveys

Pond surveys were conducted at a total of 216 ponds in Cypress Hills, Hinton, Kananaskis, Lesser Slave Lake, and Saskatoon Island (Table 3), with an additional 29 ponds in Jasper National Park. Wood frogs were the most ubiquitous species, observed at 49% of ponds surveyed. The highest amphibian species diversity, with four species, was shared between the Hinton, Kananaskis, and Saskatoon Island Provincial Park sites. In Cypress Hills, northern leopard frogs were present at 47% of ponds surveyed.

4.3 Education

Education took a variety of forms, including presentations, public displays, guided talks, children's activities, and newspaper/newsletter articles. Site specific amphibian presentations were developed for each RANA site, and posters of local amphibians were also created for some sites. An estimated total of 5969 people were informed about amphibians, RANA, the AAMP, and wetland conservation throughout the province (Table 4). Kananaskis had an active outreach program, using public events to reach large numbers of people, while Cypress Hills used a variety of media to reach people within and around the park. Saskatoon Island also reached a larger number of people through interpretative talks, and school talks were the focus of Hinton and Lesser Slave Lake educational programs. Details about presentations and activities are included in each RANA site report.

Table 1. Spring amphibian captures and morphological characteristics from Alberta RANA sites in 2003.

RANA SITE	Species*	Age**	Total#	# Per Trap Night	Sex			Snout-to-Vent Length (cm)		Mass (g)	
					M	F	Unk.	Mean	Range	Mean	Range
Hinton May 9 - June 9 (496 trap nights)	**BOTO**	**Adult**	1	0.002	0	1	0	8.3	8.3	63	63
	LTSA	**Adult**	92	0.19	38	53	1	6.4	5.0-7.5	4.8	3.0-7.7
	WOFR	**Adult**	24	0.052	10	14	0	4.4	4.1-5	9	6.9-11.6
	WOFR	**Juvenile**	2	0.004	0	0	2	1.65	1.2-2.1	1.6	1.0-2.1
	WOFR	**Overall**	26	0.052	10	14	2	4.2	1.2-5	8.4	6.9-11.6
Cypress Hills May 16 - June 30 (1000 trap nights)	**BCFR**	**Overall**	2	0.002	0	0	2	2.2	2.1-2.3	0.8	0.6-1.0
	TISA	**Overall**	6	0.006	0	0	6	9.4	8.5-9.9	28.4	21.6-32.1
	NLFR	**Overall**	0	0	0	0	0	0	0	0	0
Kananaskis May 2 - June 16 (768 trap nights)	**BOTO**	**Adult**	8	0.01	1	7	0	6.8	6.0-7.8	31.7	20.4-47.3
	LTSA	**Overall**	126	0.16	49	76	1	6.6	4.2-8.1	5.7	3.4-8.5
	WOFR	**Overall**	16	0.02	6	2	8	4.6	4.0-5.4	10.4	7.1-16.9
Lesser Slave Lake May 17 - May 30 (560 trap nights)	**BCFR**	**Overall**	38	0.068	0	1	37	2.3	1.5-3.2	1.2	0.5-1.5
	BOTO	**Overall**	27	0.048	4	0	23	5.1	2.2-7.6	18.8	1.5-51.5
	WOFR	**Adult**	199	0.36	0	0	199	3.8	2.0-6.4	7.4	2.0-27.0
	WOFR	**Juvenile**	25	0.045	0	0	25	2.4	2.0-2.7	1.2	0.5-1.5
	WOFR	**Overall**	224	0.4	0	0	224	3.6	2.0-6.4	6.7	0.5-27.0
Saskatoon Island Apr. 29 - May 19 (408 trap nights)	**BCFR**	**Overall**	9	0.02	0	0	9	2.5	2.0-2.8	3	2.2-4.7
	WOFR	**Overall**	21	0.05	3	1	17	4.7	3.8-5.7	9.2	5.0-19.0
Totals	**BCFR**	**Overall**	**49**	**0.015**	**0**	**1**	**48**	**2.3**	**1.5-3.2**	**1.5**	**0.5-4.7**
	BOTO	**Overall**	**36**	**0.01**	**5**	**8**	**23**	**6.7**	**2.2-8.3**	**37.8**	**1.5-63.0**
	LTSA	**Adult**	**218**	**0.067**	**87**	**129**	**2**	**6.5**	**4.2-8.1**	**5.3**	**3.0-8.5**
(3232 trap nights)	**NLFR**	**Overall**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	TISA	**Overall**	**6**	**0.002**	**0**	**0**	**6**	**9.4**	**8.5-9.9**	**28.4**	**21.6-32.1**
	WOFR	**Adult**	**260**	**0.08**	**19**	**17**	**224**	**4.4**	**2.0-6.4**	**9**	**5.0-27.0**
	WOFR	**Juvenile**	**27**	**0.008**	**0**	**0**	**27**	**2**	**1.2-2.7**	**1.4**	**0.5-2.1**
	WOFR	**Overall**	**287**	**0.09**	**19**	**17**	**251**	**4.3**	**1.2-6.4**	**8.7**	**0.5-27.0**

*BCFR (Boreal Chorus Frog), BOTO (Boreal Toad), LTSA (Long-Toed Salamander), WOFR (Wood Frog), NLFR (Northern Leopard Frog), TISA (Tiger Salamander).

**Adult LTSA and WOFR were 2.0g or more, whereas Juvenile LTSA and WOFR were <2.0g.

Table 2. Late summer amphibian captures and morphological characteristics from RANA sites in 2003.

RANA SITE	Species*	Age**	Total#	# Per Trap Night	Sex			Snout-to-Vent Length (cm)		Mass (g)	
					M	F	Unk.	Mean	Range	Mean	Range
Hinton Aug. 11 - Sept 13 (450 trap nights)	**BOTO**	**Overall**	**9**	0.02	2	0	7	6.1	4.0-8.2	26	7.5-65.0
	LTSA	**Adult**	**6**	0.01	4	2	0	6.4	5.6-7.5	5.6	3.8-8.4
	LTSA	**YOY**	**10**	0.02	0	0	10	4.1	3.7-4.5	1.7	1.2-2.0
	LTSA	**Overall**	**16**	0.03	4	2	10	5.1	3.7-7.5	3.5	1.2-8.4
	WOFR	**Adult**	**21**	0.047	7	6	8	4.7	4.2-5.5	13	1.7-18.2
	WOFR	**YOY**	**7**	0.015	0	0	7	2.3	1.5-2.6	1.7	1.4-2.0
	WOFR	**Overall**	**28**	0.06	7	6	15	4.1	1.5-5.5	10.2	1.4-18.2
Kananaskis Aug 17 - Sept 13 (304 trap nights)	**BOTO**	**Overall**	**19**	0.06	0	0	19	5.7	2.0-11.4	18	0.9-38.3
	CSFR	**Overall**	**1**	0.003	0	0	1	8.1	8.1	69.4	69.4
	LTSA	**Overall**	**157**	0.052	0	0	157	3	1.8-6.9	0.98	0.3-7.0
	WOFR	**Overall**	**202**	0.66	0	0	202	1.8	1.4-4.9	0.76	0.3-14.1
Lesser Slave Lake Aug 2 – Aug 16 (800 trap nights)	**BCFR**	**Overall**	**14**	0.02	0	0	14	2	1.0-3.6	0.8	0.2-2.0
	BOTO	**Overall**	**40**	0.05	0	0	40	5.2	3.3-7.5	17.5	5.0-50.0
	WOFR	**Adult**	**382**	0.48	0	0	382	2.9	1.5-5.2	2.9	2.0-20.0
	WOFR	**YOY**	**203**	0.25	0	0	203	2.4	1.0-4.3	1.3	0.5-2.4
	WOFR	**Overall**	**621**	0.78	0	0	621	2.7	1.0-5.2	2.3	0.5-20.0
Saskatoon Island July 28 - Aug 16 (400 trap nights)	**BCFR**	**Overall**	**2**	0.005	0	0	2	1.6	1.5-1.6	1.5	1.4-1.5
	WOFR	**Overall**	**156**	0.39	0	0	156	3.2	1.8-5.7	5.9	1.4-20.0
Cypress Hills July 3 – Aug 30 (1629 trap nights)	**NLFR**	**Overall**	**71**	0.044	0	0	71	4.3	3.4-9.2	6.6	3.0-60.0
	TISA	**Overall**	**4**	0.0025	0	0	4	9.5	8.1-10.6	29.4	20.5-37.5
Meanook July 4 – Aug 12 (1571 trap nights)	**BCFR**	**Overall**	**16**	0.01	1	0	15	1.7	1.4-2.7	0.4	0.3-1.0
	BOTO	**Overall**	**23**	0.015	2	10	11	4.3	1.4-7.0	12.2	0.3-45.5
	WOFR	**Adult**	**98**	0.062	26	19	53	4.1	0.7-5.1	8.8	2.5-18.0
	WOFR	**Juvenile**	**46**	0.029	0	0	46	2.9	1.5-3.9	2.8	1.5-8.0
	WOFR	**YOY**	**838**	0.53	0	0	838	2	1.0-2.8	0.9	2.2
	WOFR	**Overall**	**982**	0.63	26	19	937	2.3	0.7-5.1	1.7	0.3-18.0

RANA SITE	Species*	Age**	Total#	# Per Trap Night	Sex			Snout-to-Vent Length (cm)		Mass (g)	
					M	F	Unk.	Mean	Range	Mean	Range
Totals (5154 trap nights)	NLFR	Overall	71	0.014	0	0	71	4.3	3.4-9.2	6.6	3.0-60.0
	TISA	Overall	4	8E-04	0	0	4	9.5	8.1-10.6	29.4	20.5-37.5
	BCFR	Overall	32	0.006	1	0	31	1.8	1.4-3.6	0.9	0.4-1.5
	BOTO	Overall	91	0.018	4	10	77	5.3	2.2-7.3	18.4	12.2-26.0
	CSFR	Overall	1	2E-04	0	0	1	8.1	8.1	69.4	69.4
	LTSA	Adult	6	0.001	4	2	0	6.4	5.6-7.5	5.6	3.8-8.4
	LTSA	YOY	10	0.002	0	0	10	4.1	3.7-4.5	1.7	1.2-2.0
	LTSA	Overall	173	0.034	4	2	10	4.1	3.7-7.5	2.2	0.98-3.5
	WOFR	Adult	501	0.097	33	25	443	3.9	0.7-5.5	8.2	1.7-20.0
	WOFR	YOY	1048	0.2	0	0	1048	2.2	1.0-4.3	1.3	0.3-2.2
	WOFR	Juvenile	46	0.009	0	0	46	2.9	1.5-3.9	2.8	1.5-8.0
	WOFR	Overall	1989	0.39	33	25	1537	2.8	0.7-5.7	4.2	0.3-20.0

*BCFR (Boreal Chorus Frog), BOTO (Boreal Toad), CSFR (Columbia Spotted Frog), LTSA (Long-Toed Salamander), WOFR (Wood Frog), NLFR (Northern Leopard Frog), TISA (Tiger Salamander)

**Adult LTSA and WOFR were 2.0g or more, whereas YOY (young-of-the-year) LTSA and WOFR were <2.0g

Table 3. Amphibian species observations from all pond surveys in 2003.

RANA Site	Total # of Ponds Surveyed	Number of ponds in which species* were observed							
		BCFR	BOTO	CATO	CSFR	LTSA	NLFR	TISA	WOFR
Cypress Hills	15	3	0	0	0	0	7	2	0
Hinton	100	7	25	0	1	58	0	0	78
Jasper National Park	29	0	2	0	1	13	0	0	0
Kananaskis	82	0	19	0	14	17	0	0	28
Lesser Slave Lake	9	8	1	0	0	0	0	0	4
Meanook	0	0	0	0	0	0	0	0	0
Saskatoon Island	8	8	3	0	0	1	0	0	8
Totals	**243**	**26**	**51**	**0**	**16**	**90**	**7**	**2**	**120**

*BCFR (Boreal Chorus Frog), BOTO (Boreal Toad), CATO (Canadian Toad), CSFR (Columbia Spotted Frog), LTSA (Long-toed Salamander), NLFR (Northern Leopard Frog), TISA (Tiger Salamander), WOFR (Wood Frog).

Table 4. Summary of educational/interpretive presentations given to the public from all Alberta RANA sites in 2003.

RANA Site	# of Presentations/Events	Approximate # of People
Hinton	4	79
Cypress Hills	24	500
Kananaskis	8	4300 +
Lesser Slave Lake	17	405
Meanook	0	0
Saskatoon Island	15	685
Totals:	**68**	**5969**

5.0 DISCUSSION

The types of species captured and observed at RANA sites in 2003 were consistent with data from previous years. Wood frogs continue to be the most ubiquitous species, being widely distributed across the province and the most abundant species captured. With the exception of Hinton, wood frog capture rates were higher than in all previous years. However, evidence of wood frog breeding was common in the Hinton area. The reason for the apparent population increase is unknown, but is not unexpected due to natural population fluctuations.

Long-toed salamander population persistence continues to be fairly stable in Hinton. Population persistence in Kananaskis is similar to last year, but relative to surveys in the mid-1990's, population persistence has gone down (refer to Wilkinson and Hanus 2003). Increased human activity and development may be contributing to this apparent reduction in breeding ponds. However, trapping data from the Kananaskis RANA pond, a relatively undisturbed site, suggest a healthy local breeding population. The Hinton site had unusually low numbers of young-of-the-year relative to the number of eggs laid, which may be a result of extremely low water levels at the trapping pond, contributing to increased competition and predation. Ongoing monitoring is needed to understand trends. Expanded surveys and reported observations from northwestern Alberta revealed the presence of long-toed salamanders near the town of Peace River, representing a range extension. In addition to observations near Fairview, there was an unconfirmed observation south of the Peace River. It is important to continue expanding surveys in northern Alberta to determine the range of the long-toed salamander population.

There were two captures of Columbia spotted frogs in 2003. Columbia spotted frogs are rarely encountered in the RANA program because they are found in the Rocky Mountains at higher elevations, where survey sites are under represented. Backcountry surveys and coordinated efforts with Parks are needed to effectively inventory Columbia spotted frogs. Boreal chorus frogs tend to be absent in the Rocky Mountains and uncommon in the foothills; however, they are usually at high numbers at Lesser Slave Lake. This was a below average year for boreal chorus frogs at Lesser Slave Lake, which may be due to the population explosion of wood frogs. Although boreal chorus frogs are a fairly common species, we lack information on their population trends and should not assume their populations are stable.

The boreal toad was the third-most abundant species captured in 2003, found in four of the six RANA sites. Capture rates were generally similar to previous years, recognizing that there have been considerable fluctuations between years. There is evidence of boreal toad population declines in other jurisdictions, so it is important to continue monitoring their population trends in Alberta. Similarly, it is important to expand survey efforts within Canadian toad range because there has been only one record throughout the history of the RANA program. The toad was captured in 1998 at Lesser Slave Lake, which is at the western edge of Canadian toad distribution in Alberta (the range is roughly limited to the eastern half of the province). Neither Meanook nor Beaverhill Lake RANA sites have recorded Canadian toads, despite being located in Canadian toad range.

Northern leopard frogs were only observed in the Cypress Hills area, which is expected due to their known range. Given their current status as 'threatened' it is encouraging that there was evidence of breeding at the trapping pond. Pitfalls traps were successfully modified to be deeper and wider, improving capture efficiency. Seven of the 15 ponds surveyed at Cypress Hills had northern leopard frogs, of which five showed breeding activity. The number of tiger salamanders captured and observed in Cypress Hills was low, and as such was similar to previous years. Monitoring of a previously identified highway crossing of tiger salamanders west of Calgary did not yield any observations (other than wood frogs; Rose 2004). Surveys of nearby ponds and discussions with locals did not yield tiger salamander observations. Our understanding of tiger salamander mass movements is minimal, and it raises the question of whether heavily used roads pose a threat to migrating amphibians (see Rose 2004 for details).

Although the RANA program has operated for seven years, this is still a relatively short time period from which to draw conclusions about amphibian population trends due to their stochasticity. With improved consistency and continued monitoring we are beginning to generate an important long-term data set about amphibian distribution and population trends in Alberta. Currently, RANA data provide information on amphibian species presence and distribution, which also serve as a warning that a species may potentially be in decline due to its absence, or that certain breeding sites may be vulnerable. The data provide valuable information on timing of breeding as well as checking for possible deformities or disease. In addition, considerable life history information has been gathered. The variability in the numbers of species caught annually reinforces the need to conduct long-term monitoring.

Few amphibian species in Alberta are considered secure and wetland habitat is under threat of alteration or destruction. Maintenance of RANA sites, especially those sites in key habitats with long monitoring histories, is strongly recommended. Aside from amphibian monitoring, the RANA program provides extensive public education about amphibians and wetland conservation, which is arguably as important as monitoring. In recognition of global amphibian declines and national efforts to track amphibian population trends, Alberta's maintenance of the RANA program is critical.

6.0 MANAGEMENT IMPLICATIONS AND FUTURE RESEARCH

Management recommendations are limited given the relatively short period of time RANA has been operating. The primary recommendation is preservation of wetlands (*i.e.* prevent draining and contamination), particularly those known to have breeding populations of species at risk, and they should be carefully managed to ensure persistence of amphibian populations. Fish stocking can also have a detrimental effect on amphibians, particularly long-toed salamanders (refer to Rose 2004). We must balance the needs of amphibians with recreational activities. Minimizing potentially destructive activities around ponds is an additional consideration. On crown land, protective notations have been applied to create buffers around some breeding ponds. It is important to maintain communication with landowners and people who participate in activities around critical amphibian ponds in order to foster a sense of stewardship and appreciation for wetland ecosystems, and discourage collection of amphibians. Signage and education programs should be integrated with management activities. Future survey efforts should

focus on northern Alberta and the Rocky Mountains, and consideration should be given to establishing long-term monitoring sites in the Parkland and Prairies.

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8.0 APPENDICES

Appendix 1. Summary of historic amphibian captures at each RANA site.

A -Beaverhill Lake				
Year	**# Trap Nights**	**BCFR***	**TISA***	**WOFR***
		Total # caught	**Total # caught**	**Total # caught**
		(# caught per trap night)	**(# caught per trap night)**	**(# caught per trap night)**
1998	2073	17 (0.008)	1 (0.000)	182 (0.089)
1999	1257	1 (0.001)	1 (0.001)	111 (0.088)
2000	186	2 (0.011)	0 (0.000)	14 (0.075)

*BCFR (Boreal Chorus Frog), TISA (Tiger Salamander), WOFR (Wood Frog).

B –Cypress Hills Provincial Park				
Year	**# Trap Nights**	**BCFR***	**NLFR***	**TISA***
		Total # caught	**Total # caught**	**Total # caught**
		(# caught per trap night)	**(# caught per trap night)**	**(# caught per trap night)**
1998	180	2 (0.011)	5 (0.028)	31 (0.172)
1999	927	4 (0.004)	20 (0.022)	12 (0.013)
2000	1440	2 (0.001)	19 (0.013)	15 (0.010)
2001	N/A	N/A	N/A	N/A
2002	N/A	N/A	N/A	N/A
2003	**2629**	**2 (0.00076)**	**71 (0.027)**	**10 (0.0038)**

*BCFR (Boreal Chorus Frog), NLFR (Northern Leopard Frog), TISA (Tiger Salamander).

C –Hinton and area				
Year	**# Trap Nights**	**BOTO***	**LTSA***	**WOFR***
		Total # caught	**Total # caught**	**Total # caught**
		(# caught per trap night)	**(# caught per trap night)**	**(# caught per trap night)**
2000	743	44 (0.058)	135 (0.180)	346 (0.468)
2001	1072	13 (0.012)	161 (0.150)	69 (0.064)
2002	1646	29 (0.018)	218 (0.132)	175 (0.106)
2003	**946**	**10 (0.011)**	**108 (0.11)**	**54 (0.057)**

*BOTO (Boreal Toad), LTSA (Long-toed Salamander), WOFR (Wood Frog).

D –Kananaskis and area					
Year	**# Trap Nights**	**BOTO***	**CSFR***	**LTSA***	**WOFR***
		Total # caught	**Total # caught**	**Total # caught**	**Total # caught**
		(# caught per trap night)	**(# caught per trap night)**	**(# caught per trap night)**	**(# caught per trap night)**
1998	1068	33 (0.031)	7 (0.007)	186 (0.174)	61 (0.057)
1999	383	11 (0.029)	2 (0.005)	10 (0.026)	12 (0.031)
2000	522	3 (0.006)	0 (0.000)	6 (0.011)	3 (0.006)
2001	484	11 (0.023)	1 (0.002)	34 (0.070)	8 (0.017)
2002**	1363	39 (0.029)	3 (0.002)	465 (0.341)	213 (0.156)
2003	**1072**	**27 (0.03)**	**1 (0.0009)**	**283 (0.26)**	**218 (0.2)**

* BOTO (Boreal Toad), CSFR (Columbia Spotted Frog), LTSA (Long-Toed Salamander), WOFR (Wood Frog).

**In 2002 a new RANA trapping site was established, Kuhn's Pond, due to dry-up of old pond for 3 consecutive years.

E –Lesser Slave Lake Provincial Park		BCFR*	BOTO*	WOFR*
Year	# Trap Nights	Total # caught (# caught per trap night)	Total # caught (# caught per trap night)	Total # caught (# caught per trap night)
1997	724**	8 (0.011)	7 (0.010)	73 (0.101)
1998***	3456	5 (0.001)	23 (0.007)	33 (0.001)
1999	3312	57 (0.017)	114 (0.034)	119 (0.036)
2000	3216	26 (0.008)	84 (0.026)	52 (0.016)
2001	840	29 (0.035)	817 (0.973)	83 (0.099)
2002	1680	299 (0.178)	156 (0.093)	196 (0.117)
2003	**1360**	**52 (0.0038)**	**67 (0.049)**	**809 (0.59)**

*BCFR (Boreal Chorus Frog), BOTO (Boreal Toad), WOFR (Wood Frog).

**The number of trap nights is an estimate due to difficulties interpreting the number of trap malfunctions in original data.

***One Canadian toad was captured in 1998.

F–Meanook Biological Research Station		BCFR*	BOTO*	WOFR*
Year	# Trap Nights	Total # caught (# caught per trap night)	Total # caught (# caught per trap night)	Total # caught (# caught per trap night)
1997	518	4 (0.008)	3 (0.006)	193 (0.387)
1998	755	4 (0.005)	343 (0.454)	277 (0.367)
1999	630	2 (0.003)	7 (0.011)	23 (0.037)
2000	2090	6 (0.003)	125 (0.06)	36 (0.017)
2001	644	4 (0.006)	8 (0.012)	316 (0.49)
2002	714	1 (0.001)	12 (0.017)	65 (0.091)
2003	**1571**	**16 (0.01)**	**23 (0.015)**	**982 (0.63)**

*BCFR (Boreal Chorus Frog), BOTO (Boreal Toad), WOFR (Wood Frog).

G–Saskatoon Island Provincial Park		BCFR*	BOTO*	WOFR*
Year	# Trap Nights	Total # caught (# caught per trap night)	Total # caught (# caught per trap night)	Total # caught (# caught per trap night)
1999	1070	9 (0.008)	0 (0.000)	128 (0.120)
2000	1081	17 (0.016)	2 (0.002)	44 (0.041)
2001	996	5 (0.005)	3 (0.003)	74 (0.074)
2002	980	4 (0.004)	0 (0.000)	165 (0.168)
2003	**808**	**11 (0.014)**	**0 (0.000)**	**177 (0.22)**

*BCFR (Boreal Chorus Frog), BOTO (Boreal Toad), WOFR (Wood Frog).

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